

808 fathoms; its geographical extension is equally great, and it has also not a slight amount of variation in shape and sculpture. But I am not disposed to unite the two species. In *T. striata* the ribs are much narrower than in the typical *T. caput-serpentis* and are finely beaded or tuberos, especially towards the beaks, and they are not so close together as in the variety *septentrionalis*. This question of identity depends, however, on the capability of hereditary persistence which some species possess; and although a certain degree of modification may be caused by an alteration of conditions in the course of incalculable ages, our knowledge is not sufficient to enable us to do more than vaguely speculate, and surely not to take for granted the transmutation of species. We have no proof of anything of the kind. Devolution, or succession, appears to be the law of nature; evolution (in its modern interpretation) may be regarded as the product of human imagination. I am not a believer in the fixity of species, nor in their periodical extinction and replacement by other species. The notorious imperfection of the geological record ought to warn us against such hasty theorization. We cannot conceive the extent of this imperfection. Not merely are our means of geological information restricted to those outer layers of the earth which are within our sight, but nearly three-fourths of its surface are inaccessible to us, so long as they are covered by the sea. Were this not the case, we might have some chance of discovering a few of the missing links which would connect the former with the existing fauna and flora. It is impossible even to guess what strata underlie the bottom of the ocean, or when the latter attained its present position relatively to that of the land. The materials of the sea-bed have been used over and over again in the formation of the earth's crust; "Omnia mutantur, nihil interit;"¹ and the future history of our globe will, to the end of time, repeat the past. What does Shakespeare say, as a geologist, to such cosmical changes?

"O heaven! that one might read the book of fate,
To see the revolution of the times
Make mountains level, and the continent
(Weary of solid firmness) melt itself
Into the sea! and, other times, to see
The beachy girdle of the ocean
Too wide for Neptune's hips."

There is also the difficult problem of submarine light, evidenced by the facts of deep-sea animals having conspicuous and well-formed eyes, and of the shells of deep-sea mollusca being sometimes coloured, which is yet unsolved.

Much more remains to be done; and probably many generations, nay, centuries, must elapse before the very interesting subject which I have now ventured to submit to your consideration will be mastered or thoroughly understood in all its varied aspects. Let us then confess our ignorance, and conclude in the sublime words of the Psalmist:—"Thy way is in the sea, and thy path in the great waters, and thy footsteps are not known."²

THE BRITISH MEDICAL ASSOCIATION.

DURING the past week the British Medical Association held its forty-fifth annual meeting in Manchester. The Committee of Management for the reception of the Association deserves hearty congratulations on the success which has followed their hospitable effort. For although they were under no disadvantages of position or room, but rather the contrary, they had spared no pains whatever to secure the comfort of their guests, and they may fairly be said to have equalled or outdone their opportunity.

The class-room and lecture theatres of the Owens College and Medical School, were placed at the disposal of the Committee, and gave the Association most convenient means of holding its general business and sectional meetings. The large museum at the Medical School, the dissecting room, the physiological laboratory, the chemical laboratories and the engineering drawing room were set aside for the purposes of the Annual Museum. The museum—very extensive this year—included besides pathological and surgical specimens, plates, casts, &c., an unusually large number of histological specimens, chiefly of morbid tissues. In addition there was the usual display of surgical and scientific instruments, the latter being reinforced by the collection of physiological apparatus belong to the Medical School. The general meetings except the first were held in Prof. Roscoe's lecture theatre, and there also were delivered the special addresses in medicine,

¹ Ovid, Met. xv. 165.

² Ps. lxxvii. 39.

Surgery, Obstetrics, and Physiology. The first general meeting, and the address of the President of the Association took place in the Concert Hall, none of the college rooms being large enough for the purpose. A temporary covered way joined the Medical School to the College, and on the ground between the two buildings was erected a tent or series of tents in which were exhibited a large number of sanitary appliances under the auspices of the Manchester and Salford Sanitary Association.

The meeting of the Association was inaugurated on Tuesday morning by the Bishop of Manchester who preached a sermon in the Cathedral; and in the afternoon of the same day the first general meeting was held for the election of the president for the year and for hearing the Report of Council. The retiring president Dr. De Bartolomé, of Sheffield, alluding to the events of his official year, spoke with much spirit of the manner in which the public services of the medical men engaged in the rescue of entombed miners after the Pont-y-pridd colliery accident had been ignored by the Government and the nation; and he announced that the Council, having regard to the fact that there was no provision for the recognition of heroic or meritorious services when performed by medical men as such, had determined to confer upon the medical men concerned in the accident a medal and a testimonial scroll, and had recommended that the medal should be perpetuated as the Medal of the British Medical Association, to be awarded for like acts in the future. The latter suggestion was afterwards adopted at the second general meeting.

The president, Dr. M. A. Eason Wilkinson, Senior Physician to the Manchester Royal Infirmary, having been elected, delivered an address on Hospital Defects and their Remedies a subject which is greatly engaging the attention of local medical men. He gave a history of the Manchester Royal Infirmary and spoke with satisfaction of the union of the School of Medicine and the Owens College.

In the evening there was a reception by the President of the Association and the Senate and Council of the Owens College, held at the College.

On Wednesday a general meeting of the Association assembled to hear the special address in Medicine, by Dr. William Roberts, F.R.S., on the subject of Spontaneous Generation and the doctrine of Contagium Vivum. Dr. Roberts' treatment of the subject may be considered to fall into three divisions—physiological, pathological, and theoretical.

In the first, after alluding to the analogy which may possibly be real, between contagious fever and the action, say, of yeast in fermentation, he proceeded to consider two propositions. The first proposition is: That organic matter has no inherent power of generating bacteria, and no inherent power of passing into decomposition. To substantiate this he exhibited specimens of decomposable organic fluids which, having been sterilized, had remained in his possession undecomposed for many months or even years. Sterilization had been effected three ways:—

1. By prolonged boiling, the exclusion of germs being afterwards secured by plugs of cotton-wool.

2. By filtration through unglazed earthenware previously heated to redness, into flasks sterilized by the heat of boiling water.

3. By transferring the organic decomposable fluid, such as blood, urine, pus, etc., directly from the interior of the body to well sterilized flasks and subsequently defending them from germs by plugs of cotton-wool.

The second proposition is:—That bacteria are the actual agents of decomposition. This Dr. Roberts considers to be proved by the following considerations:—

- a. That which originates decomposition comes from the air; since removal of the plugs in any of the above cases is infallibly followed by decomposition.

- b. That which originates decomposition consists of solid particles floating in the air; since filtration of the air (as above) is able to prevent decomposition: and air which is optically pure (Tyndall) has no fecundating power.

- c. That which originates decomposition has not the nature of a soluble ferment; since decomposable fluids in which putrefaction has already set in yield filtrates through earthenware, which do not decompose, while pepsin, diastase, &c., readily pass through the same medium.

But it is nevertheless true that certain liquids, as neutralized hay, infusions, and milk, often produce bacteria even after they have been boiled for two or three hours, and when there is no possibility of subsequent infection. And it is equally true

that bacteria are invariably killed by exposure to a temperature of about 140° F. or more. Are not these facts strong evidence of abiogenesis? No: and for the following reasons:—

1. Although bacteria infallibly die at the above-named temperature their spores may not; and this is more than probable since Dallinger and Drysdale have demonstrated that while certain septic monads are destroyed on heating to 140° F., their spores survived a heat of 300° F.

2. Cohn has examined the organisms which arise under the conditions named, viz., in boiled hay-infusions, and he has demonstrated that they are never a new creation as might have been expected, but invariably the well-known bacterium *Bacillus subtilis*. Is it possible to believe, in the face of the whole theory of evolution, that abiogenesis is able at one stroke, and within seventy hours, to produce such a specialised organism as this?

3. Saprophytes are devoid of chlorophyll and hence cannot assimilate carbonic anhydride; they get their carbon exclusively from more complex carbon compounds. Hence, at least, it must be granted that saprophytes cannot have been the primordial forms of life; and the probability of the spontaneous generation of such organisms, even granting spontaneous generation as an existing process, falls in proportion.

In the second division of his address Dr. Roberts discussed the pathology of three infective diseases the cause of which has been traced in each case to infective organisms, viz., septicæmia, relapsing fever, and splenic fever. Without entering into details, it may be allowed to notice that Dr. Roberts, alluding to the subject of the antiseptic treatment of wounds, spoke of the need of a broader view of its principle, the essence of which is not to protect the wound from septic organisms, but to defend the patient against the septic poison generated under the influence of those organisms, an end which may be obtained either by the method of Prof. Lister of rigid exclusion of the septic organisms or by preventing the absorption of the pyrogen product, as, e.g., by allowing free exit for the discharges by the open method of treatment.

In conclusion, Dr. Roberts pointed to the fact that there exists a remarkable morphological identity between the organisms of certain infective diseases and other quite harmless saprophytes. Thus *Bacillus anthracis* of splenic fever only differs from *Bacillus subtilis* in the fact that its rods are motionless: while the spirilla of relapsing fever are identical in form and botanical characters with *Spirochæte plicatilis* of Ehrenberg. May not these coincidences, he suggests, point to a natural explanation of the origin of contagia? May not the harmful organisms be merely variations or sports from the harmless saprophytes resembling them, just as the bitter almond is a sport from the sweet, and the nectarine from the peach? May not typhoid fever for example, be explained as due to a variation from some common saprophyte of our stagnant pools or sewers, which under certain conditions of its own surroundings or certain conditions within the human body, acquires a parasitic habit?

On Thursday the members of the Association assembled to hear the special address in Surgery by Mr. T. Spencer Wells, F.R.C.S. After giving a retrospect of the progress of surgery, and noticing the important advances made during quite recent times, the speaker said:—

"A certain section of the community, well-meaning it may be, but led astray by thoughtless enthusiasts or self-interested itinerant lecturers, vehemently asserts that if we are to perfect ourselves in these or in other modes of saving human life or lessening human suffering, we must only do so by practice upon the human subject; we must not, as a surgeon or a physiologist, take the life of a dog or a cat, a rabbit or a sheep, a pigeon or a frog, for any scientific purpose, or with the object of benefiting the human race. Anybody may slaughter oxen and sheep by thousands for human food in any way he pleases, oysters may be eaten alive, the pheasant or the partridge, the fox or the deer may be expressly reared to supply the sportsman with exercise or the amusement of killing—in a word, the lower animals may be devoted to the use of man for any purpose that is not scientific. But if a surgeon experimentally sacrifices half a dozen dogs or rabbits in the hope of improving some operation which may prevent the loss of human life or lessen human suffering, he is branded as inhuman, and barely escapes the supervision of the police. Possibly, some of these benevolent individuals will voluntarily offer up themselves to our Committee on Transfusion, in the hope of perfecting the practice. Until they do so, they will perhaps be a little less clamorous if a few sheep or rabbits are used in the cause of humanity."

Referring afterwards to the rewards of public service in the

medical profession and the need of medical statesmanship, Mr. Spencer Wells sought to show that it would be both just and conducive to the highest public welfare that eminent members of the medical profession should be occasionally admitted to a seat in the House of Lords.

The Section of Physiology was opened with an address by the president, Prof. Arthur Gamgee, F.R.S., of Manchester. After giving a *résumé* of some of the important physiological work of the last year, including an account of the latest contributions by Engelmann and Hermann to the contact theory of the muscular current, Prof. Gamgee referred to the wishes of some physiologists and medical men to destroy the very intimate connection between medical and physiological science which at present exists in England, and deprecated any such attempt, pointing out the benefits which had resulted to both sciences by their mutual reaction. He strongly insisted, however, on the need of a sound preliminary scientific training for medical students if physiology is not by a natural process to split off from medicine owing to the sheer incapacity of the average medical student to comprehend her teachings. Prof. Gamgee concluded his address by referring to the vivisection agitation, and to the presence of Prof. Ludwig in Manchester, in the following terms:—

"We have passed, or rather we are passing, through a period of great anxiety to physiology. A popular clamour, unfortunately too well known to all of you, has imperilled the studies which we all have so greatly at heart. An Act of Parliament is now in force which, if interpreted in a spirit of hostility to science, might put a stop to these studies. But I trust that the spirit of the time, the spirit of justice too, which we think characterizes our countrymen, will render such hostility impossible, and relying upon the justice and enlightenment of the minister of the Crown to whom the enormous responsibility of carrying out this Act has been entrusted, we venture to predict that the interests of science will not ultimately suffer.

"I cannot close this address without expressing the gratification and pride with which I see amongst us the eminent man who to-day honours us by his presence. In Carl Ludwig we see one of the three or four men who, more than all others, have helped to build up the present edifice of physiology—a man to whom those of our science will refer in ages yet to come as having, perhaps more than anyone else, introduced methods of precision into physiology, and, by numerous conquests in nearly all its departments, proved their utility. We welcome him amongst us, and beg to assure him that the influence of his teaching extends not only to every university of Germany, but even to us. All of us have more or less directly learned from him, and all of us are, I trust, inspired in some measure by his intense devotion to science. All would, I hope, emulate to the extent of their powers, the example of the great head of the Leipzig physiological school, who, in unselfishly contributing to the success of his pupils, for the furtherance of the science which he loves, has seen the fullest realization of his proudest hopes."

In the evening the annual dinner of the Association was held in the Large Hall of the Assize Courts.

Prof. Kronecker, of Berlin, exhibited a 'current interrupter to secure equal intensity of opening and closing shock. The current is made by the point of a swinging bar which is kept swinging in a vertical plane by means of an electro-magnet. The point dips into mercury in order to make the current, and leaves the mercury to break it. The surface of the mercury is continually washed free from oxidized metal by a stream of water.

Prof. M'Kendrick, of Glasgow, read a paper *On the Physiological Action of the Chinoline and Pyridine Series of Compounds*, containing the results of an extended research carried on with the co-operation, first of Prof. Dewar, of Cambridge, and afterwards of Dr. Ramsay, of Glasgow. In justice to Prof. M'Kendrick and his colleagues we will not attempt to give even an outline of the peculiar effects of these series of bodies, especially as the whole of the valuable memoir will shortly be published. But we may call attention to the following inferences of more general physiological interest:—

1. There is no appreciable difference between the physiological action of the bases obtained from chincona and those derived from tar.

2. All the substances examined are remarkable for not possessing any specific paralytic action on the heart likely to cause syncope, but they destroy life, in lethal dose, either by exhaustive convulsions or by gradual paralysis of the respiratory centres, thus causing asphyxia. There is further no immediate action on the sympathetic system of nerves, but there is

probably a secondary action since after large doses the vaso-motor centre becomes involved.

3. In ascending the chinoline series, the physiological action changes in character, the lower members seeming to affect the sensory encephalic centres and the reflex centres of the cord, destroying voluntary and reflex movement; the higher members seeming to affect chiefly the motor centres, causing violent convulsions, and afterwards paralysis.

4. Speaking of these series of bodies, the mere knowledge of the constituent elements of a body is no guide to its physiological action.

5. Speaking of these series of bodies, the base, and not the acid with which it may happen to be united, determines within slight limits, the physiological character of the compound.

6. The union of methyl, ethyl, amyl, and allyl with chinoline does not entirely change its characteristic mode of action, but their presence causes a tendency to spasm and convulsion. Also in the case of the pyridine and picoline substitution compounds, increase of molecular complexity and weight does not indeed entirely change the mode of action of the simpler compound, but is always attended by a tendency to spasm and convulsion.

7. When the bases of the pyridine series are doubled by condensation, producing polymers such as dipyridine, &c., they not only become more active physiologically, but the mode of action of the condensation product differs from that of the simpler base.

Saturday was entirely taken up by excursions into the surrounding counties, Lancashire, Cheshire, and Derbyshire.

Throughout the week facilities were given to members of the Association to visit the various hospitals, libraries, manufactories, and buildings of interest in the town and neighbourhood.

OUR BOOK SHELF

Jainism; or, the Early Faith of Asoka. By E. Thomas, F.R.S. (London: Trübner and Co., 1877.)

THIS is a book which will be of great interest to orientalists and students of the science of religion and is likely to occasion a good deal of controversy. It embodies two articles published by the author in the *Journal* of the Royal Asiatic Society, the first of which endeavours to show that the Greek monograms on Bactrian coins represent dates, the hundreds being omitted in imitation of the Hindu *loka kala*, or as when we write '77 for 1877. The dates, Mr. Thomas thinks, refer to the Seleucid era (B.C. 312), and we are therefore able to place the Indo-Scythian dynasty of Kanishka, whose monuments at Mathurâ have recently been discovered, from B.C. 2 to A.D. 87. The second article challenges the usual opinion that Jainism is a late corrupt form of Buddhism and seeks to prove that Buddhism itself was originally a Jainist sect and that Asoka, the Constantine of India, was a Jainist before he was a Buddhist. His grandfather, Chandra Gupta or Sandracottus, is claimed by the Jainists, and their claim is supported by the testimony of Megasthenes; according to Abûl Fazl, Asoka himself introduced Jainism into Kashmir, and the gradual passage of his belief from Jainism to Buddhism may be detected in his rock and pillar edicts. The Bhabra edict, late in his reign, first contains positive Buddhism, and his earlier Jainist title of *Devānampiya* or "beloved of the gods," is dropped as incompatible with a creed which denied the existence of any God at all. The Mahāwanso has allowed a reference to "the twenty-four supreme Buddhas"—the number of the Jainist saints—to remain in its text, and the symbols of the Buddhas are borrowed from their Jainist prototypes. The existence of Jainism at the beginning of the Christian era is proved by the recent discoveries at Mathurâ, where the figures are nude as among the Jainists, not clothed as among the Buddhists, and the Kanishka coins lately found at Peshāwar are further evidence of Saivism and the worship of many deities, Indian, Persian, Greek, and even Roman, but not of atheistic Buddhism. It may be added that Mr. Thomas

believes that in these Kanishka coins we have evidence of the soldiers of Crassus having been settled in the extreme north-west of India.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Rainbow Reflected from Water

ON Monday last, August 6, at 7 P.M., I was standing at the end of Eastbourne Pier looking towards the sea. Behind me the sun was low on the horizon but shining brightly, overhead and out to sea rain was falling from somewhat broken masses of clouds. In front a brilliant rainbow formed a complete semicircle, the two ends apparently resting on the sea, and outside the principal bow the secondary arc was shining with considerable intensity. The sea was calm, but its surface was by no means glassy, being ruffled over with minute wavelets. Reflected from the surface of the sea, and extending in a broken curved line from the extremities of the rainbow nearly up to the pier, was a complete reproduction of the colours in the sky; the reflection, bearing in mind the ruffled surface of the water, being perfect. Not only were the colours of the primary bow reproduced, but a faint reflection of the secondary bow could be detected, whilst the dark space between the two bows, and the luminous haze which always extends for some distance from the concave edge of the primary bow, were distinctly reproduced.

The intensity of the reflected image was, as near as I could judge, one-fourth that of the actual bow. Near the horizon when the real and reflected arcs seemed to touch, there was a decided displacement of the colours, as if the diameter of the reflected bow was somewhat less than that of the original. In other words, the reflected red was not accurately in line with the red in the real bow, but appeared to line with the yellow, whilst the yellow of the reflected arc seemed a continuation of the green in the actual rainbow.

I regret that I had no polarising apparatus with me.

August 8

WILLIAM CROOKES

Science Lectures in London

It has occurred to me, while reading some lectures given in Glasgow and Manchester, that were such lectures given in London during the winter months, they would confer a great boon upon a large number of people.

Perhaps, Sir, if you were to propose such a thing through the medium of your valuable paper, some might be found to bring about such a result, as I believe no difficulty would be found in forming a society such as the Glasgow Science Lecture Association.

I hope some abler pen will be found to take up the subject.

Herne Hill, August 7

L. JEANS

Strange Dream Phenomenon

I HAVE just experienced almost as remarkable a coincidence as those adduced by Sir W. Hamilton to prove the activity of consciousness even in sleep.

I had not been to rest for forty-one hours, and was overcome by sleep while in the act of writing a short diary I am in the habit of keeping. During the time I was asleep, I dreamed of some house property in Brighton, a dream purely fictitious and very remote from anything I had previously thought of. Awakening in a short time (scarcely a minute), I found myself still writing; and on further examination I discovered that I had, following the current of my thoughts, written as much of my dream as time had allowed.

J. VINCENT ELSDEN

Edelweiss

As an old Alpine man, let me say that "Edelweiss is not localised in any part of the Alps; I have found plenty of it at far less altitudes than the natives sometimes try and make awestricken tourists believe.